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(54) DEODORIZING COMPOSITION AND METHOD

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do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:-

This invention relates to a method for deodorizing. Up to now, offensive odours have been modified or covered by addition of pleasantly smelling substances. This applies to technical fields as well as to cosmetics and hygienics. Thus, a diluting and covering effect, respectively, was achieved.

Another possibility for reducing unpleasant odours lies in the use of film-forming materials such as zinc ricinoleate or copolymers of polyvinyl pyrrolidone and vinyl acetate, which apparently fix the odour molecules by encasing fine suspended particles. However, when film-forming materials are added to scented smell-covering agents, the substrates are prevented from releasing scent molecules since they are now coated with non-evaporating films. Even desirable odours are, thus, suppressed or dampened. This so-called "cheese-plate cover" effect makes it impossible to use such compositions for arm-pits, feet and the like since it is generally known that the plugging of sweat pores may result in serious irritations of the skin. Furthermore, the stickiness of these compositions is unfavourable in a physiological sense.

Antiseptic agents are used to prevent bacterial decomposition of sweat and the development of body odours in arm-pits, on feet and the like. In this way, disagreeable odours are stopped before they may start.

Only lauryl methacrylate is considered a true smell-destroying compound; it acts by generating less odorous copolymers. A chemical effect is utilized here to destroy odours. The chemical nature of the compound and the fact that it is normally manufactured as 80% concentrate in hydrocarbons does, however, not permit its use on humans.

All previous attempts to explain the mechanisms and effects of so-called "smell-destroyers" have involved tests in the gaseous phase in order to simulate the phenomena accompanying the perception of smells as closely as possible.

Former tests (see H.P. Fiedler, "Der Schweiss", Editio Cantor, Aulendorf, 18. Beiheft der Arzneimittelforschung, 1968, page 494) have shown, for instance, that essentail oils and active substances in smell-destroying compositions primarily occupy the olfactory cells of the human nose leaving no room for "stink molecules".

All known smell-destroying agents have the disadvantage of showing no selectivities for offensive odours.

German patent 899 248 describes the use of polyvinyl pyrrolidone in preparing so-called dry perfumes. The perfume oil may be added in "dry form" to powdery compositions such as bath-salts; it is completely soluble in the bathing-water and unfolds its scent freely. Compositions of this nature which release fragrant substances to the surroundings, will, however, not remove odours.

Surprisingly, it has now been found that polyvinyl pyrrolidone soluble in water and alcohol acts as true smell-removing agent. The term "soluble in alcohol" means that the compound can be dissolved in lower aliphatic alcohols having up to 3 carbon atoms.

Suitable are polyvinyl pyrrolidones soluble in water and alcohol which have a k-value of about 5 to 150, preferably about 10 to 95 and especially preferred of about 25-75, particularly about 30 to about 60 the k-value may be defined by the following

equation:

$$k = t \quad (\log \eta \text{ rel})/c$$

in which η is the viscosity of the solution in relation to the solvent and
c is the concentration in grams per 100 milliliters of solution.

The above mentioned types of polyvinyl pyrrolidone generally have an average molecule weight of about 5000 to 2 000 000; preferred are compounds having an average molecular weight of about 10 000 to 1 000 000 and especially of about 13 000 to 450 000.

The polymeric polyvinyl pyrrolidone soluble in water and alcohol is employed in solutions or admixed with known pharmaceutical, cosmetic or technical carriers or synthetic materials.

Suitable solvents are water and mono- or polyvalent alcohols having up to 6 carbon atoms, preferably water and/or mono- or polyvalent aliphatic alcohols having 1 to 3 carbon atoms; if desired, di- to hexavalent alcohols having up to 6 carbon atoms may be added in amounts up to 50% by weight, preferably up to 30% by weight and especially up to 10% by weight. The following solvents may also be used: alcohols such as methanol, ethanol, propanol, isopropanol, butanol, sec. butanol, amyl alcohol, 2-ethyl-1-hexanol, cyclohexanol, phenol (50°C), ethylene glycol, propylene glycol, 1,3-butane diol, 1,4-butane diol, glycerol; ketone alcohols such as diacetone alcohol; aliphatic carboxylic acids such as formic acid, acetic acid, propionic acid; ether-alcohols such as "Solvofen" glycol ether (GAF), diethylene glycol, triethylene glycol, hexamethylene glycol, polyethylene glycol 400; 2,2'- thio diethanol; lactones such as butyrolactone; ester such as ethyl acetat; ketones such as methyl cylcohexanone; chlorinated hydrocarbons such as methylene dichloride, chloroform, ethylene dichloride; dichloro monofluoro methane, chloro difluoro methane; lactames such as 2-pyrrolidone, N-methyl-2-pyrrolidone, N-Vinyl-2-pyrrolidone; amines such as butyl amine, cyclohexyl amine, aniline, ethylene diamine, pyridine, morpholine, 2-amino ethanol, diethanol amine, triethanol amine, aminoethylethanol amine, 2-hydroxyethyl morpholine, 2-amino-2-methyl-1-propanol; nitro paraffines such as nitro methane, nitro ethane.

Together with lower aliphatic alcohols having 1 to 4 carbon atoms and preferably 2 to 3 carbon atoms, the following hydrocarbon halides may be used: trichloro fluoro methane, dichloro difluoro methane, 1,1,2-trichloro-1,2,2-trifluoro ethane, 1,2-dichloro-1,1,2,2-tetrafluoro ethane, 1-chloro-1, 1-difluoro ethane. The mixing ratio of hydrocarbon to alcohol generally lies between 90/10 and 60/40 parts by weight, preferably between 80/20 and 70/30 parts by weight.

Preferably, 0.1-75 parts by weight of PVP are dissolved in 99.9 - 25 parts by weight of solvent. Typically, the concentration of polyvinyl pyrrolidone in the solution amounts to about 0.1% by weight, preferably 0.2 to 10% by weight and especially to 0.3 to 3.0% by weight, based upon the total weight of the solution.

Suitable carriers are water-soluble, water-insoluble and water-swellable carriers.

Water-soluble carriers are, for instance: water-soluble sugars such as dextrose, lactose, levulose, cane and beet sugar, respectively;

sugar alchols such as sorbite;

inorganic or organic salts such as aluminum potassium sulfate, aluminum sulfate, ammonium chloride, ammonium sulfate, barium chloride, calcium chloride, chromium sulfate, copper sulfate, iron sulfate, magnesium chloride, mercury acetate, nickel nitrate, lead acetate, potassium chloride, potassium sulfate, potassium dichromate, sodium bicarbonate, sodium chloride, sodium nitrate, primary sodium phosphate, sodium pyrophosphate, sodium sulfate, sodium sulfite, sodium thiosulfate, silver nitrate, zinc sulfate;

lower water-soluble polyethylene glycols such as polyethylene glycols having a molecular weight up to about 600.

Examples for water-insoluble carriers are: vegetable and animal oils such as olive oil, palm oil, fish oil, train oil; animal and vegetable fats such as coconut oil, lard, tallow, spermaceti;

mineral oils and mineral oil products such as paraffine oil, petroleum, Vaseline (Registered Trade Mark), stearin;

inorganic carriers such a diatomaceous earth, Aerosil (Registered Trade Mark), talcum, asbestos, rock wool, silk;

organic insoluble carriers such as wood flour, cellulose, wood pulp, textile fibers.

Water-swellable carriers are plant rubbers such as gum arabic, tragant, alginates, karaya;

natural or synthetic resins such as shellac, ethyl cellulose, methyl cellulose, carboxymethyl cellulose, dextrines.

When mixing polyvinyl pyrrolidone with carriers, the weight ratio lies between about 1:999 and 999:1; preferred is a weight ratio of polyvinyl pyrrolidone to carrier in the range of about 10/90 to 90/10 and especially of about 25/75 to 75/25.

In spray compositions, the smell-removing polyvinyl pyrrolidone is preferably used in amounts of 0.3 to 5% by weight, more preferably 0.5 to 3% by weight and especially 1 to 2% by weight of

the total spray composition without propellant.

In lotions, the polyvinyl pyrrolidone is preferably employed in amounts of 0.1 to 5% by weight, more preferably 0.5 to 3% by weight and especially 1 to 2% by weight of the total lotion.

In tablets, the polyvinyl pyrrolidone may normally be employed in amounts of 0.1 to 99.9% by weight, preferably 10 to 99.0% by weight and especially 40 to 98% by weight of the tablet.

The smell-removing agent may be used in combination with typical smell-improving additives for technical, cosmetic, medical and hygienic fields. Examples for these known additives are taste-improving agents, flavours, perfumes, fixatives, anti-oxidants, preservatives, dyes, solvents and/or dispersion bases such as creams or lotions. The mentioned materials are employed in usual concentrations.

When using the smell-removing agent in deodorizing compositions, the concentration of the aqueous and/or alcoholic solution of polyvinyl pyrrolidone or of the mixture of polyvinyl pyrrolidone with carriers normally amounts to about 5 to 100% by weight, preferably 10 to 100% by weight and especially 20 to 100% by weight of the total composition.

The use of polyvinyl pyrrolidone in the above mentioned concentrations results in smell-removing compositions which completely remove bad odours for long periods, i.e. for 24 hours or longer. Polyvinyl pyrrolidone is especially suited for removing odours considered unpleasant, repulsive, nauseous or otherwise offensive by humans and animals.

Polyvinyl pyrrolidone used as sole active substance in alcoholic or aqueous solutions (as deodorant spray for arm-pits, feet etc.) can give complete freedom of body odours for an entire day. Should a smell of sweat have developed already, it can be spontaneously removed when sprayed once with the present solution. If an aqueous solution of polyvinyl pyrrolidone in any concentration is then used for washing, followed by rinsing with clear water, the typical smell may disappear completely and not return.

The same spraying solution also removes the smell of onions or pickled herrings from hands.

Even the smell of rotting flowers or decaying meat, of feces, or offensive odours from garbage cans as well as undesirable kitchen odours may be removed.

The same applies to tobacco smoke, cadaverous smells, bad breath especially that caused by suppurating wounds in the mouth, and strong-smelling cheese.

When using polyvinyl pyrrolidone as smell-removing agent, the final composition may also contain perfume oils which will fully release their individual scent without being impeded by the active compound; the addition of cosmetic oils for skin-care is also possible and will not interfere with the smell-removing effect of the composition.

The following examples are illustrative of the present invention. Unless otherwise stated, all parts are parts by weight. In each Example, the polyvinyl pyrolidone sample was one producing a k-value of 60.

Example 1

A deodorant spray is prepared by dissolving 1.0 parts of polyvinyl pyrrolidone and 0.5 parts of perfume oil in 28.5 parts of alcohol. The solution containing the active substance is then filled into containers in a conventional way while adding 35.0 parts of Frigen 11 and 35.0 parts of Frigen 12 as propellant (Frigen is a Registered Trade Mark).

Example 2

A deodorant spray is prepared by dissolving 0.5 parts of polyvinyl pyrrolidone, 1.5 parts of isopropyl myristate and 0.5 parts of perfume oil in 28.5 parts of ethanol. The solution containing the active substance is then filled into containers by conventional means, adding 70.0 parts of Frigen 12/114 - 40/60 as propellant.

Example 3

An aqueous lotion (room spray) for mechanical spraying devices is prepared from 10.0 parts of polyvinyl pyrrolidone, 89.8 parts of water and 0.2 parts of potassium sorbate.

Example 4

A deodorizing mouth-rinse is prepared from 1.0 parts of polyvinyl pyrrolidone, 98.7 parts of distilled water, 0.2 parts of potassium sorbate as preservative and 0.1 parts of saccharine.

Example 5

The hands of several test-persons were contacted with freshly cut onion pieces. After rinsing with water, the hands still had a specific and rather penetrating smell. Even repeated washing with water and soap could not remove this smell; it seemed to be fixed in a chemosorptive way to the keratin of the skin.

When the hands were washed once with an aqueous 1% solution of polyvinyl pyrrolidone and rinsed with clear water, the typical smell disappeared completely and did not return.

Example 6

A solution of polyvinylpyrrolidone in water (3% by weight) was applied to the

arm pits of several test persons; already existing body odour was removed completely and did not return for 24 hours. The protection against body odour given by the present agent lasts about 14 hours longer than with commercial compositions on the basis of antiseptic substances.

Example 7

Polyvinyl pyrrolidone powder as delivered by the manufacturer was diluted to the use-concentration by stirring 2 grams of the compound into 98 grams of water.

Example 8

The solution of Example 7 was employed in the following tests:

(a) Filleted fish was placed into the solution for a short time, i.e. less than 1 minute. After removal of the fillets from the solution, the typical fish odour had disappeared completely.

(b) An offensively smelling dish rag was immersed into the solution and squeezed several times to ensure thorough wetting. This took no more than 1 minute. After removal, the dish rag was completely odourless.

(c) Rotting stems of, for instance, orchids and poppies which develop an especially repulsive and penetrating smell, were dipped into the solution for a short time, and the vases were also cleaned with the solution. After this treatment, the offensive smell had disappeared.

(d) Meat, the surface of which showed some decay was placed into the solution for about 2 minutes and then rinsed with clear water.

The mould which had already appeared as well as the black discoloration of the surface and the nauseous odour were completely gone. The meat was again edible.

(e) A sausage which had been stored for 14 days showed mould at the cut surface and its skin was smeary. After having been placed into the solution for 2 minutes, the mentioned superficial traces of decay had disappeared, and the sausage could be eaten.

(f) Natural skin for sausages had a bad odour and was smeary. It was placed into the solution where the mentioned defects disappeared completely. The hands of the person conducting this test did also become odourless.

(g) Hands which had been in contact with pickled herrings were in vain washed several times with water and soap. After immersing the hands into the solution and drying them, no smell could be detected, and the smell did not return.

(h) Within a period of 6 months, fifty persons of both sexes and of different ages were cured of an especially repulsive type of bad breath. This odour known as "foetor ex ore" is caused by gingivitis, stomatitis ulcerosa, dentitio difficile, infected tooth extraction wounds and the like. The test-persons rinsed their mouths vigorously with the above solution. The odour was removed spontaneously and completely. No undesirable side-effects were observed.

Example 9

A room spray was prepared by dissolving 2 grams of polyvinyl pyrrolidone in 90 grams of isopropyl alcohol, 5 grams of triethylene glycol and 3 grams of perfume oil. The solution containing the active substance was then filled into containers while 15 grams of Frigen 11/12 and 7.5 grams of carbonic acid were added as propellant.

Example 10

For the following tests, the person conducting the test held the spray container of Example 9 over the head and walked around the room to be treated.

(a) The smell of human feces in an especially serious case of pathological diarrhoea was removed rapidly and completely from a toilet, as well as the smell of a cat's feces from a room.

(b) The effectiveness of the spraying composition against kitchen odours was tested with

(1) garlic,
(2) onions,
(3) sauerkraut,
(4) radish salad,
(5) strong-smelling cheese, and
(6) stewed fish.

All odours disappeared completely.

(c) Tobacco smoke of any kind (cigarettes, cigars, pipe) was removed immediately and completely.

(d) The smell of garbage was removed spontaneously and lastingly from a waste-disposer shaft as well as from garbage cans and other containers.

(e) Rotting potatoes were sprayed and were then odourless.

(f) Liver was left to decay in a closed glass container. When the liver was completely liquefied, the container was opened in the open air. Only persons having a rather insensitive stomach could approach the container. After spraying with the above composition, the container could be brought close to the nose, and no repulsive odour could be detected.

(g) After a room had been carpeted, an offensive odour remained which could be removed by spraying with the above composition.

(h) A laboratory was sprayed with ammonia and formaldehyde, respectively, until the test persons showed serious irritations of eyes and respiratory tracts. The above

spraying composition was then used and the persons left the room for 3 minutes. When entering again, they could only detect a slight perfumation of the air.

Example 11

A spraying composition for rooms and textiles was prepared by dissolving 5 parts of glycerol, 2. parts of polyvinyl pyrrolidone and 3 parts of perfume oil in 90 parts of isopropyl alcohol. The solution was then filled into containers, adding 5 parts of carbon dioxide as propellant.

Example 12

The composition according to Example 11 was tested as follows:

(a) Heavy fuel oil, freshly cut onion rings and camphor, respectively, were placed upon the bottom of glass containers provided with a lid.

(b) Patches of coarse wool cloth having a size of about 1.5 sq. in. each, were suspended close above the surface of the test substance.

(c) After remaining in the containers for 2 hours, the cloth patches were removed and sprayed with the above composition.

(d) After 5 minutes in the open air, the patches were examined and proved completely odourless.

Example 13

Only one side of a wool sweater showing strong signs of perspiration was sprayed with the composition of Example 11; the sweater was left in the open air over night. The treated side was then odourless while the other side still smelled "sweaty".

Example 14

A tablet against mouth and stomach odours was prepared by compressing 0.5 grams of polyvinyl pyrrolidone and 0.5 grams of sorbite.

After drinking beer and eating fish, test persons took one tablet each and let it dissolve in the mouth. Bad breath was removed immediately. In a second test, the dissolved tablet was swallowed with some mineral water. In this way, even offensive odours arising from the stomach could be removed.

Example 15

The deodorizing spraying compositions of Examples 1 and 2 were used on about 100 test persons and resulted in spontaneous removal of perspiration odours from arm pits and feet. When treating one side of the test person with commercial products and the other side with a composition in accordance with the present invention, the present compositions proved superior with regard to compatibility and duration of the effect. Commercial products often caused allergic reactions and resulted in a reddening of the arm pit; this was never the case with the present compositions. They could even be applied to already irritated parts of the body without interfering with the healing process. The effectiveness of the present compositions normally lasts two- to four-times longer with commercial products.

Example 16

A deodorizing body spray was prepared by dissolving 2 parts of polyvinyl pyrrolidone and 1 part of perfume oil in 92 parts of isopropyl alcohol. The solution containing the active substance was then filled into containers under addition of 5 parts of carbon dioxide as propellant.

WHAT I CLAIM IS:-

1. A method for deodorizing comprising contacting matter requiring to be deodorised with polyvinylpyrrolidone (PVP) dissolved or dispersed in a suitable carrier.

2. A method according to claim 1 wherein said PVP is dissolved in a solvent comprising water and/or an alcohol.

3. A method according to claim 1 wherein 0.1 - 75 parts by weight of PVP are dissolved in 99.9 - 25 parts by weight of solvent.

4. A method according to claim 2 or claim 3 wherein a solution of PVP is sprayed into or over matter to be deodorised.

5. A method according to claim 4 wherein the PVP is sprayed from an "aerosol" container by means of a propellant.

6. A method according to claim 1 wherein said PVP is dispersed in a carrier, the weight ratio of PVP: carrier being within the range 1:999 to 999:1.

7. A method according to any one of the preceding claims wherein said carrier has a perfume dissolved or dispersed therein.

8. A method according to any one of the preceding claims wherein the PVP has a k-value in the range 5-150.

9. A method according to any one of the peceing claims wherein the PVP is administered orally.

10. A method of deodorising substantially as any exemplified in the Examples.

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